

Epi Notes



North Carolina Department of Health and Human Services ♦ Division of Public Health

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Communicable Disease Reporting Is Way Up and Setting Record Numbers

*Prepared by Kathryn Dail, Nurse Epidemiologist
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Background

The General Communicable Disease Control Branch (GCDC) receives its statutory authority under Article 6 of Chapter 130A of the N.C. General Statutes. This statute contains most, but not all, of the communicable disease laws. The laws specify who is required to report. The rules for reporting communicable disease are contained in 15A NCAC 19A .0100. These rules include, in rule .0101, a list of reportable diseases, conditions, and positive lab results that must be reported. A link to these rules may be found on the DPH website at <http://www.epi.state.nc.us/epi/gcdc.html>.

The Good News

In 2002, the Office of Epidemiologic Investigation and Surveillance (OEIS) in GCDC processed in a record number of outbreak investigations and reports of disease under surveillance by GCDC (excluding STD) more than any year since 1987, when public health records began to be kept in electronic database in North Carolina, (*See figures 1 & 2*). (One has to go back to years of high measles morbidity in the early 1960's and prior decades to find higher totals.) Reporting is up due to changes in reporting requirements, increased federal funding for state and regional activities, and the continued hard work and dedication of local health departments in their communities.

In September 1998, rule .0101 was extended to include laboratory results for many additional microorganisms. This rule makes the state health department aware of diseases and potential outbreaks at the time of diagnostic testing, and serves as a monitoring tool for physician reporting.

Epidemiologists in the General Communicable Disease Control, Immunization and HIV/STD Branches review lab reports daily as they are received in the state office. Local health departments are notified promptly by phone or fax of time-sensitive and unusual reports of disease as a follow-through measure to improve reporting and control measure efficiency. More routine reports of disease for investigation are checked against existing files (pend-

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ing, reported, and registries) and forwarded via mail to the counties.

Increased federal funding expanded disease surveillance infrastructure at the state and regional levels in 2002. An additional demand on surveillance unit resources resulted from activities generated by the newly created Public Health Regional Surveillance Teams (PHRST) organized with bioterrorism funds. These teams assist in the early detection, protection, and investigation of health threats across a broad range of chemical, biological, and physical agents. Federal funding for food-borne diseases under a CDC grant also has prompted more outbreak investigations leading to increased reporting.

Ultimately, reporting is up because of increased local health department activity supported by the Surveillance Unit staff. Most health departments have experienced cutbacks in staff during the last year, making assistance by the surveillance unit even more important. Local health departments have access to public health physicians or nurse epidemiologists 24 hours a day, seven days a week, to assist in disease investigation, management, and reporting.

The Not-So-Good News

State funding has fallen behind the demand for resources to manage the data, resulting in a large number of cases in the pending files. The lack of adequate state funding directly impairs the ability of the surveillance unit to respond as quickly and as completely to all but the highest-priority needs. Requests from local health departments for assistance continue to take the highest priority, always considering the threat or potential threat of the disease or condition under investigation.

What You Can do to Help

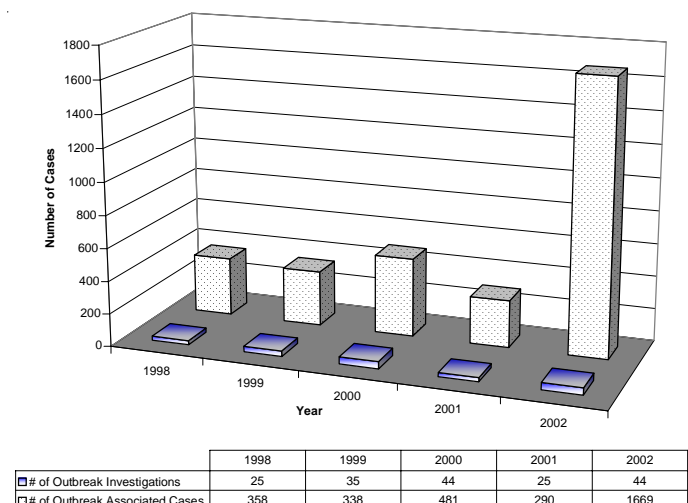
If you are responsible for the communicable disease program in your health department, *stay organized and stay on top of investigations through communication!* Contact the General Communicable Disease Control Branch (919-733-3419) to get a free **Checklist of Suggestions to Improve Reporting**.

Plans for the Future

As the Epidemiology Section plans for the future, GCDC hopes to make electronic reporting between local health departments, laboratories, the state, and the Centers for Disease Control a reality. Planning necessitates the design of software and computer systems that will interface with the National Electronic Disease Surveillance System. Even though this process is expected to take most of the next two years, it will result in more efficient, more streamlined and less labor-intensive reporting activity at every level.

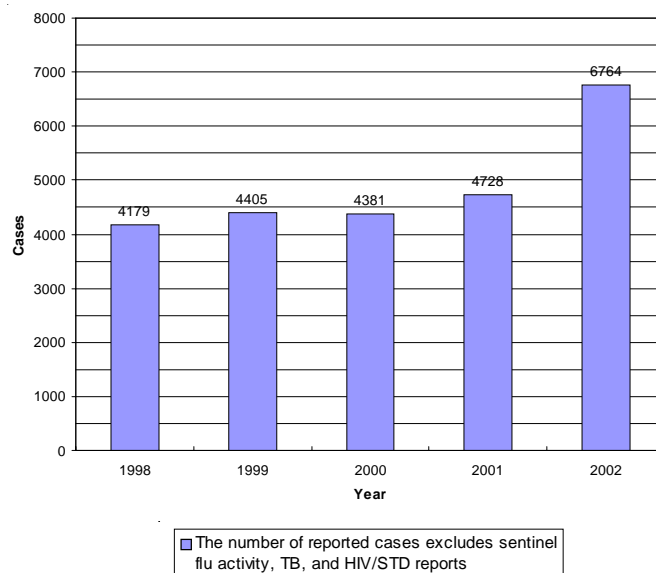
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Disease Outbreak Investigations 1998-2002 by the General Communicable Disease Control Branch



(Figure 1)

Reported Cases of General Communicable Disease in North Carolina 1998-2002 (as of March 9, 2003)



(Figure 2)

Influenza Sentinel Surveillance Program

*Prepared by Torrey McLean, Surveillance Administrator,
General Communicable Disease Control Branch*

In a joint effort with the State Laboratory of Public Health, the General Communicable Disease Control Branch has expanded its participation in the U.S. Influenza Sentinel Physicians Surveillance Network to monitor the status of state-wide influenza activity. Sentinel physicians, university health centers, and public health agencies report "influenza-like illness" (ILI) to CDC each week and collect representative throat cultures for virus strain identification. [For purposes of this surveillance program, the ILI case definition is fever (100 degrees F or higher, oral or equivalent) *and* cough or sore throat.] This program provides important epidemiological data to the state health department in order to monitor influenza activity in North Carolina, and it also supports CDC influenza surveillance throughout the U.S. Moreover, this effort could provide rapid recognition of new influenza strains with pandemic potential. This is the fourth consecutive year that the Division of Public Health has participated in this important program.

Last winter, 36 health providers throughout the state regularly reported ILI to CDC. During this winter season, a total of 39 health providers participate in the program. This group of sentinels consists of a wide variety of practice types (pe-

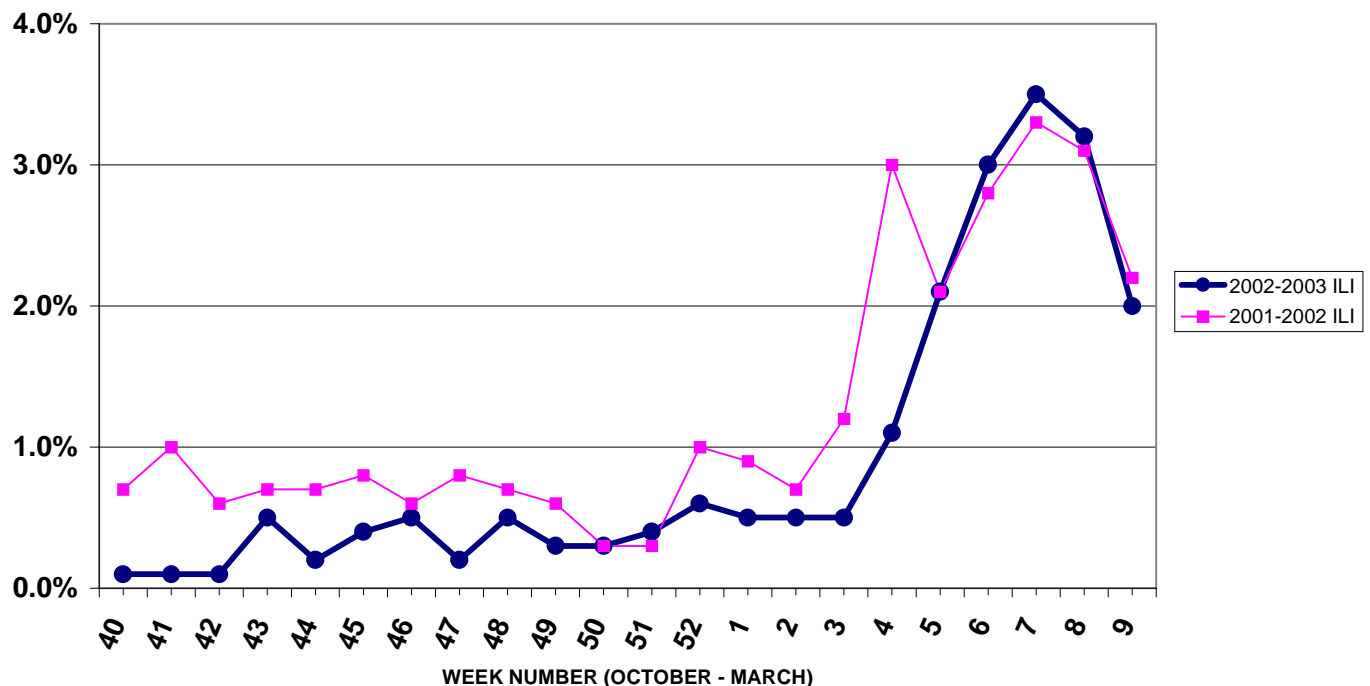
diatrics, family practice, internal medicine, etc.), as well as local health departments, university student health centers, and private practitioners. Each week, the participants in this program report the total number of patient visits each week and the number of those patients with ILI, with the ILI patients broken down into four age groups. Consequently, physicians and other public health providers throughout the state report ILI identified in the general populace, while university health providers enable us to monitor influenza in a very diverse student population from other states and countries. The influenza sentinel surveillance program began on September 29, 2002 and will conclude on May 17, 2003.

This expansion of the influenza surveillance program has helped public health personnel monitor the spread of influenza in the state more effectively than during previous years. In addition to helping detect new strains with pandemic potential, timely identification of circulating influenza virus strains also can help determine whether antiviral drugs might be useful in preventing or treating ILI.

Each weekly report of information that has been reported to CDC and by the State Laboratory is available on the N.C. Division of Public Health's Communicable Disease Control website at www.epi.state.nc.us/epi/gcdc/flu.html.

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INFLUENZA LIKE ILLNESS IN SENTINEL SITE PATIENTS NORTH CAROLINA 2001-2002 & 2002-2003 (As of March 6, 2003)



HIV Prevention School

Prepared by Myra L. Allen, MBA, MHA, Public Health Educator, HIV/STD Prevention and Care Branch



The HIV/STD Prevention and Care Branch is sponsoring its first HIV Prevention School (HPS). It will be held June 4-6, 2003 in Fayetteville, N.C. at the Holiday Inn Bordeaux. The purpose is threefold: to provide an effective credential-based training to beginner, intermediate, and advanced professionals working in the field of HIV prevention; to meet existing infrastructure needs of the state health department; and to build the capacity of existing and start-up nonprofit community-based organizations (CBOs) in North Carolina.

Currently, the various agencies across North Carolina that provide training may or may not be approved by the Branch. However, there is no major credential/certification process in the State to ensure that health educators, outreach workers, lay health advisors, peer educators, and others working in HIV prevention are disseminating consistent, accurate, culturally-sensitive and current HIV/AIDS/STD information. It is our intent to establish a standard of practice. HPS will consist of tracks that will meet the needs of beginner, intermediate, and advanced professionals working in HIV prevention. Tentative tracks include HIV specifics for those working in substance abuse and mental health; outreach training; working with the faith community; and organizational capacity building. On the last day, concurrent institutes will focus on overarching issues such as Prevention for Positives, Working with Men who have Sex with Men (MSM), and other areas of special interest.

The HIV/STD Prevention and Care Branch has recruited state and national capacity-building assistance providers to serve as faculty, and it is anticipated that participants will earn continuing education units. In addition, to further strengthen the relationship with substance abuse partners, the Branch will apply for HIV specific substance abuse credit with the North Carolina Substance Abuse Professional Certification Board.

For further information about North Carolina's HIV Prevention School, contact Myra L. Allen at 919-733-9529 or myra.allen@ncmail.net.

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Taking It to the Streets in Robeson County

Prepared by Marti Eisenberg Nicolaysen, Non-Traditional Counseling, Testing and Referral Sites (NTS) Coordinator, HIV/STD Prevention and Care Branch



Robeson County (pop. 132,339) is a mostly rural county located in south-east North Carolina and is the largest county in the State in terms of square miles. Recent unemployment figures showed Robeson County's rate to be 12 percent compared to 5.9 percent statewide. Mental illness and substance abuse, particularly alcohol and crack cocaine, are extremely prevalent and are directly linked to the high number of syphilis cases reported in this county. When the HIV/STD Prevention and Care Branch conducted a Rapid Ethnographic Community Assessment Process (RECAP) in 2001, transportation to traditional health care facilities was identified by health care providers and at-risk community members as one of the largest barriers to health care access.

Robeson County has been experiencing an increase in syphilis since 1996. By year-end 2001, the infectious syphilis rate had almost tripled, from 23.3/100,000 to 73.0/100,000. In 2001, Robeson County ranked 14th in the nation in the number of infectious syphilis cases reported, with a rate over 33 times higher than the national average. Although rates declined in 2002, Robeson County still has syphilis rates that are significantly higher than the statewide and national averages.

The Branch has been concerned about an impending increase in HIV rates due to the syphilis epidemic because, as demonstrated in several national studies, syphilis plays a major role in accelerating the spread of syphilis. The Branch felt it was important to move quickly to identify syphilis and HIV cases, and to provide education, referral and partner notification services in order to prevent a possible future HIV epidemic in Robeson County that would mirror the current syphilis epidemic.

Robeson County's poverty level, low literacy level, geographic size and lack of public transportation negatively impact the way people access health services. In an attempt to address some of these issues, the Branch formally submitted a request to the Centers for Disease Control and Prevention for funds to support a mobile HIV/STD unit in Robeson County. The CDC approved this request in the fall of 2002 and funds were approved to purchase a 30-foot mobile unit that would include a waiting area, registration/counseling/testing room

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Hand Hygiene and Reduction of Spores on the Hands

Prepared by Emily E. Sickbert-Bennett, M.S.,
Disease Investigation Specialist,
Public Health Regional Surveillance Team IV

During a terrorist attack, if exposure to *Bacillus anthracis* is suspected or proved, current guidelines recommend hand washing with a non-antimicrobial or antimicrobial soap and water in order to prevent acquisition of anthrax. Because the available data



on the susceptibility of *B. anthracis* is limited, experiments were conducted testing the efficacy of selected hand hygiene agents against *Bacillus atrophaeus* as a surrogate for *B. anthracis*. The agents tested included a non-antimicrobial soap, a 2% chlorhexidine gluconate agent, a 61% ethyl alcohol agent, and a dampened antibacterial microfiber towel that releases hypochlorite.

These experiments were conducted using the Standard Test Method for Evaluation of the Effectiveness of Health Care Professional Handwash Formulations (ASTM E 1174-94). Briefly, the volunteers' hands were contaminated with a suspension of *B. atrophaeus* spores and were then washed with one of the selected products for either 10, 30, or 60 seconds. The microorganisms were recovered from the hands by placing both hands into large-sized gloves filled with a sampling and neutralizing solutions. The gloved hands were massaged for 60 seconds, and a sample of the rinseate was retrieved and assayed.

The efficacy measurements showed that hand washing with a non-antimicrobial soap under running water was very effective (up to 2.4 log₁₀ reduction) in reducing spore contamination on the hands. Handwashing with a 2% chlorhexidine gluconate agent was also effective (up to 2.1 log₁₀ reduction), and neither the non-antimicrobial soap nor the chlorhexidine gluconate showed any increased efficacy at greater hand hygiene times (i.e., no difference between 10 seconds and 30 or 60 seconds). With a 10-second hand hygiene episode, non-antimicrobial soap and water and chlorhexidine gluconate were significantly better than the chlorine-containing towels at eliminating spores from the hands. However, the chlorine-containing towels with a 60-second use time were superior to chlorhexidine gluconate and showed similar efficacy to non-antimicrobial soap and water. Hand hygiene with the alcohol-based (waterless) hand rub did not reduce the spores (~0 log₁₀ reduction) significantly at any time tested.

These data suggest that current recommendations are likely adequate for decontaminating potentially exposed individuals with soap and water. The use of an antimicrobial agent known for its activity against vegetative bacteria, chlorhexidine gluconate, did not improve elimination of spores.

In a setting where soap and water may not be available, waterless rubs containing ethyl alcohol should not be used because they are ineffective in spore removal and spore inactivation. Instead, small amounts of water should be carried in rescue vehicles, which would allow for hand hygiene with chlorine-containing towels.

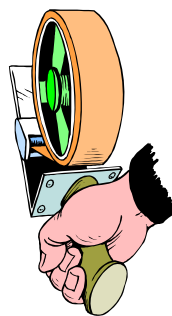
Citation:

Weber DJ, Sickbert-Bennett E, Gergen MF, Rutala WA. "Efficacy of Selected Hand Hygiene Agents Used to Remove *Bacillus atrophaeus* (a Surrogate of *Bacillus anthracis*) from Contaminated Hands," *Journal of the American Medical Association*. 2003; 289: 1274-1277.

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Duct Tape and Plastic

Prepared by Samara A. Adrian, Planner,
Office of Public Health Preparedness & Response



Recently, the American public was advised to consider stocking duct tape and plastic sheeting to help protect them from a weapons of mass destruction (WMD) event. A more expansive discussion on how to handle WMD events may be found on the U.S. Department of Homeland Security website at www.ready.gov. The guidance provided there is intended to help prepare people for a low probability/high consequence WMD event. But... the DHS themes "Be Informed, Make a List, Make a Plan" make sense anytime. To North Carolinians, this kind of individual and family preparedness should be a part of life as usual. Here, all-too-frequent natural disasters—droughts, tornadoes, floods, winter storms and hurricanes—have taught us to plan and prepare for emergencies. Identifying a contact location and number for those separated; obtaining and storing emergency supplies of canned goods and bottled water; preparing a medical kit; and having battery-operated radios and flashlights on hand—all make good sense.

It doesn't take a WMD event to make such planning advisable. If the recent Kinston fire had released toxic fumes, as sometimes happens in trucking and train accidents, local residents may have been directed to evacuate or to shelter in place. If they had to shelter in place, that duct tape and plastic sheeting would have come in handy.

In addition to being informed and making a plan, practice your plan like you would fire drills. If you don't practice using your plan, when it comes time to use it you won't remember it. For example, everyone in a home should know how to exit a house that's on fire. They should also know

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where to meet if they get separated. A key component to planning is assigning responsibility. Each member of a family should know what he or she is expected to do. This is even more important in a fast-breaking event like a tornado, flash flood or WMD event.

Being informed on the nature of possible threats, your family's and community's plans to respond, and being able to locate critical telephone numbers to contact in emergencies will reduce panic and potential injury and expedite getting assistance when necessary. North Carolina's Department of Health and Human Services plans and trains for health emergencies. So should you. Other North Carolina web sites addressing WMD issues are: www.epi.state.nc.us/epi; www.nc.gov; www.dhhs.state.nc.us/dph/; www.ncem.org; and www.nchan.org. When it comes to emergencies, what you don't know really can hurt you.

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Preparation for April Clinical Laboratory Improvement Act Inspection at the North Carolina State Laboratory of Public Health

Prepared by Leslie A. Wolf, Ph.D., Assistant Director, North Carolina State Laboratory of Public Health



Every two years, the N.C. State Laboratory of Public Health (NCSLPH) must be extensively reviewed by federal government Clinical Laboratory Improvement Act (CLIA) inspectors. The code of federal regulations (CFR) pertaining to high-complexity clinical laboratories must be met in order for daily operations to continue. The general categories include quality control, quality assurance, patient test management, personnel competency, proficiency testing and equipment maintenance. Extensive documentation of activities relating to each of these areas is required for federal review. Modifications to the CFR are made periodically, and laboratories must stay current with new regulations. NCSLPH is working diligently to be prepared for the next inspection April 21-25, 2003. We thought it might be of interest to highlight just a few of the requirements NCSLPH follows to maintain the CLIA certificate.

Patient Test Management

Involves having written procedures for specimen labeling, specimen storage and handling, assuring that specimen integrity is maintained. Only tests requested on the requisition will be performed, and the requisition must have a unique patient identifier, a complete submitter address, and a date of specimen collection. The test record system must include documentation of unique patient identifier, date and time of specimen receipt in the laboratory, judgment of satisfactory or unsatisfactory specimen for testing, and identification of personnel involved in patient testing. The test reporting system must be able to provide results in a timely, accurate, reliable and confidential manner. In addition, the test report must identify the laboratory's name and address, which test was performed, and the test result. The laboratory must develop policies regarding "panic values" so that the responsible party is alerted when test results indicate an imminent or life-threatening condition.

Quality Control

Involves not only the test procedure itself, but also regulates the laboratory's physical facility and ensures safety precautions are in place for all phases of testing (pre-analytic, analytic, and post-analytic). Documentation of validation and verification of test methods, maintenance of equipment and instrumentation, proper storage of reagents, materials, and supplies must be available for inspectors. Procedure manuals must include requirements for specimen collection and processing, criteria for specimen rejection, step-by-step performance of the procedure, preparation of reagents and controls used in the test procedure, limitations of the methodology, and pertinent literature references. The laboratory directors must approve the procedure manuals and any changes that occur subsequently.

Personnel

Outlines the minimum criteria for various positions within the laboratory, such as laboratory director, technical supervisor, clinical consultant, general supervisor, cytology general supervisor, cytotechnologist and testing personnel. As an illustration, the CFR states that the laboratory director is responsible for the overall operation and administration of the laboratory, including the employment of personnel who are competent to perform test procedures, record and report test results promptly, accurately and proficiently, and for assuring compliance with the applicable regulations. Qualifications for doctoral degreed laboratory director are outlined below:

- Must hold an earned doctoral degree in a chemical, physical, biological or clinical laboratory science
- Must be certified by ABMM, ABCC, ABB, ABMLI or other board deemed comparable by HHS.

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Highlights from the APHL Infectious Disease Conference in Denver, Colorado, March 5-7, 2003

Prepared by Leslie A. Wolf, PhD, Assistant Director, North Carolina State Laboratory of Public Health



The first annual Association of Public Health Laboratories (APHL) Infectious Disease Conference was organized to provide a forum for public health laboratories to discuss common challenges and opportunities in the current clinical laboratory testing arena. The theme for the conference was "Molecular Methods: Impact on Public Health Practice, From BT to STDs". Experts from public, private, state and federal laboratories were presenters and moderators at all sessions.

Highlights from the meeting included the following topics:

Testing for West Nile Virus and other Arboviruses

Connie Austin, DVM, Illinois Department of Health, spoke about the Illinois experience with West Nile Virus (WNV) in 2002. WNV has surprised experts in the field by the speed with which it has spread across the U.S. since 1999 and with the diversity of its routes of transmission (transfusions, transplants and breast milk). Dr. Austin shared the experience of having WNV activity in Illinois months earlier than anticipated, providing insights to other laboratories in preparing for the 2003 arbovirus season. Illinois had a wet spring and a hot, dry summer in 2002, presenting ideal conditions for increased arbovirus activity. In order to efficiently handle the large numbers of avian, veterinary, mosquito and human specimens, laboratory testing was divided among public health, agriculture and veterinary school laboratories. Once a county reached the limited allotment for the numbers of crows or blue jays positive for WNV, it was assumed that WNV activity was present. Thus, prevention and education campaigns were implemented and no further avian testing was performed for that county. Dr. Austin highlighted the critical need for successful communication, collaboration and coordination between the laboratory staff and epidemiology staff during the outbreak. In Illinois, 99 press releases *on WNV alone* were issued to ensure that the media played an integral role in dissemination of important arboviral information to the public and health agencies. In addition, an Intranet website and training courses for mosquito control programs were established, which greatly enhanced timely dissemination of information. Issues that remain to be explored in 2003 include the problems associated with multiple databases that require duplicate data entry; development of criteria for

specimen acceptance; comparative analysis of test results between states, CDC and private laboratories; confirmation of positive test results; and building surge capacity in the laboratory and in the epidemiology office.

Use of Amplified Tests in Blood Banks

Susan Stramer, PhD, American Red Cross, spoke about the use of nucleic acid amplification tests in screening donated blood for HIV. The American Red Cross supplies approximately 50% of blood in the U.S., and it must meet strict Good Manufacturing Practices (GMP) and FDA guidelines in order to do so. To limit the spread of known agents via the blood supply, the American Red Cross uses central nucleic acid amplification testing (NAAT) laboratories for testing pooled samples for HIV and other bloodborne pathogens such as HCV. Because the viral load is extraordinarily high during the initial phase of infection, samples from 16 donors can be pooled and tested for HIV and HCV by NAAT. Since implementing a sensitive multiplex NAAT assay to screen donated blood units and utilizing discriminating NAAT assays to confirm and identify the viruses, the safety of the blood supply has been dramatically increased. Before NAAT was utilized, the risk of acquiring HIV was approximately 1 in 1.5×10^6 and 1 in 276,000 for HCV. After the American Red Cross instituted NAAT pooling and testing procedures, the risk of acquiring HIV from the blood supply is approximately 1 in 2.1×10^6 and 1 in 1.8×10^6 for HCV. Because the testing algorithm is both sensitive and cost efficient, it may be a viable model for public health laboratories in areas of low prevalence for HIV or HCV.

Bioterrorism: Issues and Applications of Molecular Assays

Douglas Anders, PhD, Federal Bureau of Investigation, spoke about the role of molecular methods in detecting nucleic acids and proteins from biological weapons, their benefits and limitations, and their admissibility in a court of law. A number of methods currently exist for detecting these agents, including antigen detection (hand-held assays, TRF, EIA, ECL), nucleic acid detection (PCR, hybridization, and fingerprinting), and spectroscopic (FTIR and UV spectrophotometer) analysis. Maintaining a balance between cost, turn-around-time, sensitivity and specificity is a challenge because of the benefits and limitations of each type of test. While some of the tests are rapid, sensitive and specific (eg., PCR), others are not as sensitive or specific (eg., hand-held assays). In addition, many times a unique test is required for each agent (eg., PCR) and the result is not considered confirmatory (eg., PCR). Finally, molecular methods cannot determine if an organism is viable or non-viable, which may be critical information in a criminal case. Historically, public

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***(Highlight from the APHL Infectious Disease Conference
continued from page 7)***

health laboratories provided test results for infectious disease diagnosis and for epidemiologic disease control, while law enforcement laboratories focused on forensic characterization of evidence gathered in criminal investigations. In this era of ever-increasing bioterrorism threats, public health laboratories now must deal with chain of custody and admissibility of laboratory results on a daily basis. When the FBI becomes involved in an investigation, it is critical that those methods used in the laboratory meet the established criteria for admissibility, and that laboratorians can act as expert witnesses in matters of science and technology. If laboratory results do not meet the established admissibility criteria, then subsequent evidence gathered by following leads based on the initial laboratory results may be deemed inadmissible in court. Dr. Anders called this “Fruit of the Poisonous Tree.” Because of the partnerships formed between public health and law enforcement, much progress has been made to ensure that the goals of both entities are met.

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***(Taking it to the Streets in Robeson County, continued from
page 4)***

and restroom. The primary use of this mobile unit would be to take HIV/STD education, referral, and screening to the most affected communities in this county whose residents cannot access traditional health care settings. The Branch awarded these funds to Robeson County in November of 2002, and the county will accept delivery of the mobile unit by May 31 of 2003.

Robeson County houses various community-based organizations involved in HIV/STD prevention. The Robeson County Health Department (RCHD) plans to collaborate with these agencies, the faith community, and the Branch’s Field Services and Syphilis Elimination Project to staff the mobile unit, target areas of need and identify “hot spots” for outreach and testing. The RCHD will staff at least one individual on the mobile unit that can conduct HIV/STD counseling, testing, referral and outreach activities. Staff from collaborating agencies will also participate in prevention activities on a regular basis. During down times, the State and RCHD may use the mobile unit for other health prevention activities across the State, such as supporting Rapid Intervention Outreach Teams, screening events and local health fairs.

The Branch hopes to mirror the results obtained by Rocky Mount OIC, a community-based organization funded through the North Carolina Non-Traditional Counseling, Testing and Referral Sites (NTS) project. The Branch funded OIC to

purchase a Mobile Area Health Clinic (MAHC). This unit was designed to take HIV/STD education and clinical services directly to neighborhoods in which socioeconomic problems abound—including poverty, illiteracy, substance abuse and a high rate of STDs. Rocky Mount OIC works with the Edgecombe and Nash county health departments and various community-based organizations throughout the region. They staff the MAHC with outreach specialists from OIC and a registered nurse from the health department. The MAHC offers a range of screening services, from blood pressure and diabetes checks to HIV and syphilis testing. There is also a private clinic area to conduct full STD examinations. In 2002, 290 HIV and 294 syphilis tests were conducted on board the unit; two positive HIV and two positive syphilis cases were identified.

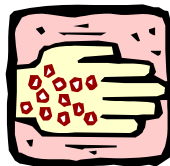
The MAHC is a model for “bringing services to the community” in Edgecombe County; the Robeson County mobile unit will afford that county’s residents a like opportunity to receive more accessible HIV/STD services by taking those services to the neighborhoods that need them.

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Smallpox: Old Scourge—New Threat

*Prepared by Alford W. Piercy, Epidemiologist Specialist
Mecklenburg County Health Department*

Poxviruses originate in the family of *Poxviridae*, subfamily *Chordopoxvirinae*, genus *Orthopoxvirus*, which include vaccinia, monkeypox, cowpox, and variola. Of the many poxviruses, these four are infectious to humans, with variola being the agent of greatest concern by causing smallpox. Until recent times, variola infections in human populations caused great morbidity and mortality (up to 40%) in unimmunized humans. Smallpox results in no human asymptomatic carrier state and has no animal reservoir. At present, the only reservoirs are designated laboratories.



Although the World Health Organization reported the world’s last case in 1978 in England and worldwide vaccination programs were ended in 1980, an accidental release of smallpox virus from a laboratory or deliberately by terrorist groups could result in calamity long before the outbreak could be controlled. In the general population immunity is very low, with only researchers in orthopoxvirus research laboratories and some military personnel undergoing current immunizations. During 2001, the Centers for Disease Control (CDC) began vaccinating federal public health smallpox response team members. Since January 2003, the CDC has made smallpox vaccinations available to civilian volunteer health-care workers.

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(*Smallpox: Old Scourge–New Threat*, continued from page 9)

Monkeypox is the single other member of the orthopox genus to present a serious threat to human health. This zoonotic disease claims as its reservoir the African ground squirrel, with man and monkey as incidental hosts to occasional and limited outbreaks of the disease. Monkeypox results in a 15 percent mortality rate, as compared to a 40 percent rate for smallpox in unvaccinated humans.

In the ancient world, evidence of smallpox surfaced with the recent examination of mummified remains of the Egyptian royal family during the reign of Ramses V about 1157 B.C. Actual written records first appeared in fourth century A.D. China and later in Greek and Roman literature. Still, no definitive descriptions of smallpox were recorded, probably because no Greek or Latin word yet appeared for this disease with its distinctive rash. “Variola” first received its name during the sixth century in Europe by a churchman named Marius in Switzerland, who used the Latin word *varius* or *varus* meaning “spotted pimple” to describe the rash that developed into pustules. In the tenth century, the Anglo-Saxon Europeans used the word *pocca* to describe an exanthematous disease then spreading to northern Europe. Fifteenth century writers were the first to add *small* to the *pocca* to distinguish smallpox from syphilis, the “great pox,” which was becoming a second human health scourge on the continent. By the dawn of the sixteenth century, smallpox was imported to the New World by European explorers, devastating some Native American peoples and helping end the long-established cultures of both the Aztecs and Incas.

In 1796 Edward Jenner, an English physician, experimented with material taken from the pustules of cowpox (a related orthopoxvirus species) found on the hands and arms of milkmaids. He proceeded to rub it into a skin cut or puncture of a healthy person, resulting in a mild febrile illness from which the person soon recovered. More importantly, he demonstrated that such a person inoculated with this material he called *vaccine*, from the Latin word *vacca* (cow), protected the person from “taking” the smallpox. Jenner published his findings and within 5 years his procedure was being called *vaccination* and had spread to all of Europe and other countries. His procedure of removing material from one pustular lesion on one arm to that of another arm (arm-to-arm inoculation) soon showed syphilis was also transmitted, prompting physicians to begin experimenting with growing the virus on the flank of cows for a safe vaccine supply. Finally, in 1898, England banned the procedure of arm-to-arm vaccination in favor of the new “safer” assured supply of cow-produced vaccine. With this new source of vaccine readily available, soon the scourge of smallpox diminished throughout Europe and North America. Most of Europe claimed to be smallpox free at the end of World War I, and by the end of 1945 transmission of the disease stopped on both continents.

During the 1920’s the French made a significant advance in vaccine development by taking the newly harvested vaccine from calves and air-drying or freeze-drying for the purpose

of long-term storage and distribution. By the 1940’s a newer process was developed in which heat-stable, freeze-dried vaccines were produced in volume in the industrialized countries of the west. Finally, the opportunity to eradicate smallpox was being considered by the Pan American Sanitary Organization and in the 1950’s with extensive vaccination campaigns, smallpox was eradicated in all of the Americas except Brazil. The former Soviet Union proposed the first worldwide eradication in 1958 to the World Health Assembly. After a slow beginning in the 1960’s, a Global Eradication Program based on mass vaccinations and the development of a system to detect and contain small outbreaks with “ring vaccination” soon brought the prospect of global eradication into reality. During 1978, the last case of smallpox was recorded in England by the World Health Organization. Edward Jenner could not have realized in his own time the significance of his simple arm-to-arm vaccination that would ultimately end this long-feared infectious disease.

In the twenty-first century, smallpox has again emerged as a potential threat to the global community. Since variola virus is very stable and retains infectivity outside the human host for an indefinite period, it has been manufactured into bio-weapons. Intentionally dispersed in aerosol form, this virus is highly infectious. On exposure to aerosolized virus, variola travels from the upper respiratory tract to the lungs and on to the nearby lymph nodes, where replication causes systemic viremia. After an incubation of 10 to 12 days, a rash develops prompting the quarantine and vaccination first of family members and other contacts, hence the term “ring vaccination,” starting with a single case. Variola continues to disseminate virus to the spleen, liver, bone marrow, and nearby lymphoid tissues. A sudden onset of clinical signs includes febrile illness, tremors, vomiting, and body aches in the head and joints. During days 14 to 16, the rash develops into lesions and then pustules from which virus can be recovered. Examination of blood or pustule exudates by electron microscopy or the molecular sensitive polymerase chain reaction method usually confirms human smallpox. Two epidemiologic types of smallpox are recognized: variola major, with the highest mortality rate of up to 40 percent, and variola minor, with a fatality rate of 1 to 2 percent, both occurring among unvaccinated patients. In variola major cases, some patients experience rapid fulminant disease causing prostration and bleeding into skin and mucous membranes, resulting in a fatal hemorrhagic outcome within 7 days.

Smallpox is often confused with chickenpox. Smallpox presents with a clear picture of lesions centrifugally appearing after the fever has subsided. All lesions appear similar in size and involve sebaceous glands that result in severe pitting and disfigurement. Chickenpox produces a rash and, with superficial lesions appearing greater on covered parts of the body, is centripetal in design with no deep scarring and is seldom fatal.

Live vaccinia virus is the immunological agent used to immunize people who work with orthopox virus in laboratories or

(continued on page 11)

**Reported Communicable Diseases, North Carolina
January-March 2003 (by date of report)***

Disease	Year-to-Date (First Quarter)			1 st Quarter 2003	Comments / Note
	2003	2002	Mean (98-2002)		
Campylobacter	146	98	94	146	
Chlamydia, laboratory reports	6024	5323	5184	6024	
Cryptosporidiosis	9	13	6	9	Note 1 & 2
Cyclosporiasis	1	0	0	1	
Dengue	2	0	0	2	
E. coli O157:H7	3	6	8	3	Note 3
E. coli, Shiga toxin-producing	3	-	-	3	Note 9 and 10
Ehrlichiosis, Monocytic	5	1	-	5	Note 1 & 2
Encephalitis, California group	4	1	-	4	Note 1 & 4
Foodborne, C. Perfringens	2	0	9	2	
Foodborne, other	3	2	2	3	
Foodborne, staphylococcal	1	4	4	1	
Gonorrhea	3507	3849	4329	3507	
Haemophilus influenzae	5	11	11	5	
Hepatitis A	22	90	49	22	
Hepatitis B, acute	40	46	59	40	
Hepatitis B, chronic	204	186	160	204	
Hepatitis C, acute	3	6	6	3	Note 1 & 4
HUS-TTP	1	2	-	1	Note 1 & 2
HIV/AIDS	567	394	370	567	Note 5
Legionellosis	7	3	3	7	
Listeriosis	5	1	-	5	Note 8
Lyme disease	12	11	6	12	
Malaria	5	6	5	5	
Meningococcal disease	6	11	20	6	
Meningitis, pneumococcal	7	21	21	7	
Mumps	2	1	2	2	
Rabies, animal	178	132	131	178	
Rocky Mountain Spotted Fever	34	30	13	34	
Salmonellosis	261	223	204	261	
Shigellosis	205	65	66	205	
Strepto. A, invasive	31	50	-	31	Note 2
Syphilis, total	115	166	286	115	Note 6
Tuberculosis	37	49	61	37	
Tularemia	1	1	1	1	
Typhoid, Acute	1	0	0	1	
Vaccinia	1	-	-	1	Note 8
Vibrio, other	3	4	-	3	Note 2
Vanco. Resistant Enterococci	127	157	-	127	Note 2
Whooping cough	45	11	25	45	

* Preliminary data, as of 4/15/2003. Quarters are defined as 13-week periods.

Notes: 1. =Not reportable in this entire time period; 2. Became reportable 8/1/1998; 3. Became reportable 10/1/1994; 4. Became reportable as such 8/1/1998; previously within other category ("Encephalitis"; and "Hepatitis, non A-non B"); 5. Earliest report with HIV infection or AIDS diagnosis; 6. Primary, secondary and early latent syphilis; 7. Became reportable 7/1/1997; 8. Became reportable 7/2001; 9. Became reportable 2/15/2003; 10. Replaces E. coli O157:H7 as of 2/15/2003.

(Preparation for April CLIA Inspection at the NCSLPH, continued from page 6)

- Must have at least two years of laboratory training or experience and two years of experience in directing or supervising high complexity testing
- Limited to directing five laboratories

The Laboratory Improvement Unit at NCSLPH is an excellent resource for questions regarding CLIA requirements, quality improvements in the laboratory, and training opportunities. Technical consultants can be reached at 919-733-7186 for specific questions. For further details about 42 CFR 493, please visit <http://www.access.gpo.gov/nara/cfr/>.

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(Smallpox: Old Scourge–New Threat, continued from page 9)

handle animals infected with vaccinia. Other persons to consider vaccination are doctors, nurses, and first responders. The Advisory Committee on Immunization Practices (ACIP) of the CDC recommends NOT vaccinating any person with a deficient immune system. This would include patients with HIV/AIDS, organ transplants, cancer, skin disorders such as eczema and dermatitis, and pregnant women. At present, newer cell culture vaccines grown in human embryonic lung cells and another grown in green monkey cells promise fewer systemic side effects and are undergoing reactogenicity studies before release.

Since Jenner's time, vaccines have made great advances but the method of vaccination with vaccinia virus has changed little. A bifurcated (twin-point) needle is dipped into the vaccine and multiple punctures are made into the skin in a small circular pattern. This is not so different from Jenner collecting pus from cowpox pustules and with a needle puncturing the skin to admit the "vaccine."

Care should be taken by persons during their immunization period and before the scab forms over the vaccination site not to touch the area and transmit live vaccinia virus to others who are not immunized or who may have immune system disorders. In the United States, the CDC maintains stocks of smallpox vaccine for those requiring protection from possible exposure to smallpox. The Human Vaccine Immune Globulin and cidofovir are available from CDC for treatment of those experiencing a major vaccinal reaction that is indurate and erythematous.

All physicians or health care providers should be aware of a patient presenting with rash, lesions, and pustules as a possible first case of smallpox. Prompt isolation of the patient and vaccination of all contacts should start immediately, followed by notification of police, local health authorities, and the Centers for Disease Control.

* * * * *

Employee Recognition: Employee of the Quarter Lee Hunter, DMV

*Prepared by Patsy P. West, Administrative Assistant
Epidemiology Section*



Dr. Lee Hunter has received the Epidemiology Section's Employee Recognition Award for the Spring quarter of 2003. He was nominated in the category of "Service Excellence."

Dr. Lee Hunter began his employment with the state of North Carolina on September 1, 1986 in the Division of Health Services which later became the Division of Public Health. Dr. Hunter is a highly trained, experienced veterinary medical professional from the Occupational and Environmental Epidemiology Branch who provides assessment, consultation and education regarding the public health risks associated with zoonotic diseases to the people of North Carolina. These services are provided to local health departments, health care providers, animal control officers, veterinarians and the public at large.

Some of Dr. Hunter's many accomplishments are: Participation in planning the public health response to West Nile Virus; providing Foot and Mouth Disease disaster training; developing and implementing a program to promote spaying/neutering of pets; providing consultation to local health departments and private veterinarians on bioterrorism agents; distributing over 1,000,000 rabies tags and 50,000 "I Care" tags annually with tag number/receiver database management; establishing the Spay/Neuter Program and Fund from the sale of "I Care" animal rabies tags and "Pet Lover" license plates; producing 2,200 CD's of computer-based rabies educational programs to health care providers, health departments and veterinarians at a cost savings of \$25,410 over the previous process of printing hardcopies and providing around-the-clock consultative services for health care providers, local health departments and veterinarians whose patients/clients may have been exposed to rabies (resulting in more than 7,000 contacts).

In addition to Dr. Hunter's abilities and service excellence, he has a sense of humor that is second to none. If you are having a "bad day," give Dr. Hunter a call and your "bad day" vanishes. He has a gift of making one laugh and for putting everything into the proper perspective. The Epidemiology Section is most fortunate to have him on the public health team.

In addition to receiving the Epidemiology Section's Employee Recognition Award, Dr. Hunter will be presented with a gift certificate from the Section Management Team.

* * * * *

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